JOURNAL OF SCIENTIFIC COMPUTING

Volume 26, Number 1 **January 2006**

CONTENTS

High-order Compact Schemes for Nonlinear Dispersive Waves 1
Jichun Li and Miguel R. Visbal

Numerical Evaluation of the Accuracy and Stability Properties of High-order Direct Stokes Solvers with or without Temporal Splitting 25
E. Leriche, E. Perchat, G. Labrosse, and M.O. Deville

Stability Analysis of Difference Methods for Parabolic Initial Value Problems 45
Ercília Sousa

Bounded Error Schemes for the Wave Equation on Complex Domains 67
Saul Abarbanel, Adi Ditkowski, and Amir Yefet

Space–Time Adaptive Solution of First Order PDES 83
Lars Ferm and Per Lötstedt

On a Rational Linear Approximation of Fourier Series for Smooth Functions 111
A. Nersessian and A. Poghosyan

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 26, Number 2 **February 2006**

CONTENTS

A Time-Splitting Spectral Method for the Generalized Zakharov System in Multi-Dimensions 127
Shi Jin and Chunxiong Zheng

High Accuracy Schemes for DNS and Acoustics 151
T. K. Sengupta, S. K. Sircar, and A. Dipankar

Uzawa Conjugate Gradient Domain Decomposition Methods for Coupled Stokes Flows 195
Jonas Koko

Adaptive Finite Element Methods for the Identification of Elastic Constants 217
Tao Feng, Mårten Gulliksson, and Wenbin Liu

A Bi–Hyperbolic Finite Volume Method on Quadrilateral Meshes 237
H. J. Schroll and F. Svensson

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 26, Number 3 **March 2006**

CONTENTS

Dynamic Tubular Grid: An Efficient Data Structure and Algorithms for High Resolution Level Sets 261
Michael B. Nielsen and Ken Museth

Metric Identities and the Discontinuous Spectral Element Method on Curvilinear Meshes 301
David A. Kopriva

Frequency Optimized Computation Methods 329
Stefan Jakobsson

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 27, Numbers 1–3 June 2006

CONTENTS

Special Issue: Proceedings of the Sixth International Conference on Spectral and High Order Methods (ICOSAHOM-04)

Foreword 1
David Gottlieb, Jan S. Hesthaven, George Karniadakis, and Chi-Wang Shu

Invited Talks

Dispersive and Dissipative Properties of Discontinuous Galerkin Finite Element Methods for the Second-Order Wave Equation 5
M. Ainsworth, P. Monk, and W. Muniz

On a Stable Spectral Method for the grad(div) Eigenvalue Problem 41
M. Azaïez, R. Gruber, M. O. Deville, and E. H. Mund

Overlapping Schwarz and Spectral Element Methods for Linear Elasticity and Elastic Waves 51
Luca F. Pavarino and Elena Zampieri

A High-Order Accurate Method for Frequency Domain Maxwell Equations with Discontinuous Coefficients 75
Eugene Kashdan and Eli Turkel

Minisymposium and Contributed Talks

An Efficient Discretization of the Navier–Stokes Equations in an Axisymmetric Domain. Part 1: The Discrete Problem and its Numerical Analysis 97
Z. Belhachmi, C. Bernardi, S. Deparis, and F. Hecht

Identification and Reconstruction of a Small Leak Zone in a Pipe by a Spectral Element Method 111
Z. Belhachmi, A. Karageorghis, and K. Taous

Fluid-Structure Interaction by the Spectral Element Method 123
N. Bodard and M. O. Deville

Mesh Update Techniques for Free-Surface Flow Solvers Using Spectral Element Method 137
Roland Bouffanais and Michel O. Deville

Large-Eddy Simulation of the Lid-Driven Cubic Cavity Flow by the Spectral Element Method 151
Roland Bouffanais, Michel O. Deville, Paul F. Fischer, Emmanuel Leriche, and Daniel Weill

On the Total Variation of High-Order Semi-Discrete Central Schemes for Conservation Laws 163
Steve Bryson and Doron Levy

Element-by-Element Post-Processing of Discontinuous Galerkin Methods for Timoshenko Beams 177
Fatih Celiker and Bernardo Cockburn

Finite-Volume-Particle Methods for Models of Transport of Pollutant in Shallow Water 189
Alina Chertock, Alexander Kurganov, and Guergana Petrova

Higher-Order Gauss–Lobatto Integration for Non-Linear Hyperbolic Equations 201
Bart De Maerschalck and Marc I. Gerritsma

Building Blocks for Arbitrary High Order Discontinuous Galerkin Schemes 215
Michael Dumbser and Claus-Dieter Munz

Parallel 3D Mortar Element Method for Adaptive Nonconforming Meshes 231
Huiyu Feng, Catherine Mavriplis, Rob Van der Wijngaart, and Rupak Biswas

Direct Minimization of the Discontinuous Least-Squares Spectral Element Method for Viscoelastic Fluids 245
Marc I. Gerritsma

Algebraic Fractional-Step Schemes for Time-Dependent Incompressible Navier–Stokes Equations 257
Paola Gervasio and Fausto Saleri

A Fifth Order Flux Implicit WENO Method 271
Sigal Gottlieb, Julia S. Mullen, and Steven J. Ruuth

Optimal Strong-Stability-Preserving Time-Stepping Schemes with Fast Downwind Spatial Discretizations 289
Sigal Gottlieb and Steven J. Ruuth

Optimal Spectral-Galerkin Methods Using Generalized Jacobi Polynomials 305
Ben-Yu Guo, Jie Shen, and Li-Lian Wang

Adaptive Central-Upwind Schemes for Hamilton–Jacobi Equations with Nonconvex Hamiltonians 323
Alexander Kurganov and Guergana Petrova

Direct Numerical Simulation in a Lid-Driven Cubical Cavity at High Reynolds Number by a Chebyshev Spectral Method 335
Emmanuel Leriche

Moving Mesh Discontinuous Galerkin Method for Hyperbolic Conservation Laws 347
Ruo Li and Tao Tang

Spectral Vanishing Viscosity Method for Large-Eddy Simulation of Turbulent Flows 365
Richard Pasquetti

Spectral Element Methods on Unstructured Meshes: Comparisons and Recent Advances 377
Richard Pasquetti and Francesca Rapetti

Mass- and Momentum Conservation of the Least-Squares Spectral Element Method for the Stokes Problem 389
Michael M. J. Proot and Marc I. Gerritsma

Staggered Finite Difference Schemes for Conservation Laws 403
Gabriella Puppo and Giovanni Russo

A Spectral Approach for Generating Non-Local Boundary Conditions for External Wave Problems in Anisotropic Media 419
Ivan L. Sofronov and Olga V. Podgornova

High Order Accurate Solution of Flow Past a Circular Cylinder 431
Erik Stålberg, Arnim Brüger, Per Lötstedt, Arne V. Johansson, and Dan S. Henningson

Pseudo Spectral Methods Applied to Problems in Elasticity 443
Chris Talbot and Andrew Crampton

Beyond Wiener–Askey Expansions: Handling Arbitrary PDFs 455
Xiaoliang Wan and George Em Karniadakis

The Use of Curved Elements in the Finite Element Approximation of Thin Plates by High Order *p* and *hp* Methods 465
Christos Xenophontos

High-Order Well-Balanced Finite Difference WENO Schemes for a Class of Hyperbolic Systems with Source Terms 477
Yulong Xing and Chi-Wang Shu

Stabilization Methods for Spectral Element Computations of Incompressible Flows 495
Chuanju Xu

Non-Linear Filtering and Limiting in High Order Methods for Ideal and Non-Ideal MHD 507
H. C. Yee and B. Sjögreen

Spherical Harmonic–Generalized Laguerre Spectral Method for Exterior Problems 523
Zhang Xiao-yong and Guo Ben-Yu

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 28, Number 1 **July 2006**

CONTENTS

An Energy-Stable High-Order Central Difference Scheme for the Two-Dimensional Shallow Water Equations 1
Matthew Brown and Margot Gerritsen

A Matrix Decomposition MFS Algorithm for Problems in Hollow Axisymmetric Domains 31
Th. Tsangaris, Y.-S. Smyrlis, and A. Karageorghis

Solving Stable Sylvester Equations via Rational Iterative Schemes 51
Peter Benner, Enrique S. Quintana-Ortí, and Gregorio Quintana-Ortí

Further Development of a Conservative Front-Tracking Method for Systems of Conservation Laws in One Space Dimension 85
Liu Yan and Mao De-kang

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 28, Numbers 2/3 September 2006

CONTENTS

Special Issue in Honor of Prof. David Gottlieb

Introduction 121
Saul Abarbanel

Non-Linear PML Equations for Time Dependent Electromagnetics in Three Dimensions 125
S. Abarbanel, D. Gottlieb, and J. S. Hesthaven

A Mathematical Approach in the Design of Arterial Bypass Using Unsteady Stokes Equations 139
Valery Agoshkov, Alfio Quarteroni, and Gianluigi Rozza

One-sided Post-processing for the Discontinuous Galerkin Method Using ENO Type Stencil Choosing and the Local Edge Detection Method 167
Rick Archibald, Anne Gelb, Sigal Gottlieb, and Jennifer Ryan

Homogenization of Periodically Varying Coefficients in Electromagnetic Materials 191
H. T. Banks, V. A. Bokil, D. Cioranescu, N. L. Gibson, G. Griso, and B. Miara

Enhanced Coercivity for Pure Advection and Advection–Diffusion Problems 223
Claudio Canuto

Prediction from Partial Data, Renormalization, and Averaging 245
Alexandre J. Chorin, Ole H. Hald, and Raz Kupferman

A Boundary Integral Equation Method for Photonic Crystal Fibers 263
Min Hyung Cho, Wei Cai, and Tsing-Hua Her

Adaptive Edge Detectors for Piecewise Smooth Data Based on the *minmod* Limiter 279
A. Gelb and E. Tadmor

Recovering High-Order Accuracy in WENO Computations of Steady-State Hyperbolic Systems 307
Sigal Gottlieb, David Gottlieb, and Chi-Wang Shu

The Shifted Box Scheme for Scalar Transport Problems 319
Bertil Gustafsson and Yaser Khalighi

Padé -Legendre Interpolants for Gibbs Reconstruction 337
J. S. Hesthaven, S. M. Kaber, and L. Lurati

On Parabolic Boundary Layers for Convection–Diffusion Equations in a Channel: Analysis and Numerical Applications 361
Chang-Yeol Jung and Roger Temam

Denoising by BV-duality 411
Stefan Kindermann, Stanley Osher, and Jinjun Xu

Gibbs Phenomena 445
Peter D. Lax

L^{∞}-Stable Approximation of a Solution to div(Y) = f for $f \epsilon L^2$ in Two Dimensions 451
Yvon Maday

Turbulence Effects on Kinetic Equations 459
Steven A. Orszag, Hudong Chen, Sauro Succi, Jonas Latt, and Bastien Chopard

On the Method of Difference Potentials 467
V. Ryaben'kii

Digital Flight: The Last CFD Aeronautical Grand Challenge 479
M. D. Salas

Simulating Plasma Microwave Diagnostics 507
J. S. Shang

Numerical Study of a Modified Time-Stepping θ-Scheme for Incompressible Flow Simulations 533
Stefan Turek, Ludmila Rivkind, Jaroslav Hron, and Roland Glowinski

Numerical Methods and Nature 549
E. Turkel

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 29, Number 1 **October 2006**

CONTENTS

Asymptotic Fourier Coefficients for a C^∞ Bell (Smoothed-"Top-Hat") & the Fourier Extension Problem 1
John P. Boyd

High Order Fast Sweeping Methods for Static Hamilton–Jacobi Equations 25
Yong-Tao Zhang, Hong-Kai Zhao, and Jianliang Qian

Fifth-Order Weighted Power-ENO Schemes for Hamilton-Jacobi Equations 57
Susana Serna and Jianliang Qian

CFL-Violating Numerical Schemes for a Two-Fluid Model 83
Steinar Evje and Tore Flåtten

Efficient Low Dissipative High Order Schemes for Multiscale MHD Flows, II: Minimization of $\nabla \cdot B$ Numerical Error 115
H. C. Yee and Björn Sjögreen

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 29, Number 2 **November 2006**

CONTENTS

A Parallel Overset Grid High-Order Flow Solver for Large Eddy Simulation 165
P. Morgan, M. Visbal, and D. Rizzetta

A Spectral Method for the Time Evolution in Parabolic Problems 201
A. Y. Suhov

Implementation of the Mortar Method in the Wavelet Context 219
Silvia Bertoluzza, Silvia Falletta, and Valérie Perrier

Blind Wavelet Compression of the Solution of a Nonlinear PDE with Singular Forcing Term Within Optimal Order Cost: Stability of Restricted Approximation to Small Errors 257
Daniel Goujot

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index, Science Citation Index Expanded, SCOPUS, Zentralblatt Math

JOURNAL OF SCIENTIFIC COMPUTING

Volume 29, Number 3 **December 2006**

CONTENTS

Partitions for Spectral (Finite) Volume Reconstruction in the Tetrahedron 299
Qian-Yong Chen

An Improvement of a Recent Eulerian Method for Solving PDEs on General Geometries 321
John B. Greer

A Level Set Framework for Capturing Multi-Valued Solutions of Nonlinear First-Order Equations 353
Hailiang Liu, Li-Tien Cheng, and Stanley Osher

Conservative Finite Difference Formulations, Variable Coefficients, Energy Estimates and Artificial Dissipation 375
Jan Nordström

Abstracted/Indexed in:
ACM Guide To Computing Literature, Applied Mechanic Reviews, Boundary Elements Abstracts Newsletter, Compendex, Compendex Plus, CompuMath Citation Index, Computer Abstracts International Database, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Information Compendex, Inspec, ISI Alerting Services, Mathematical Reviews, PASCAL, Science Citation Index, Science Citation Index Expanded, SCOPUS, Zentralblatt Math